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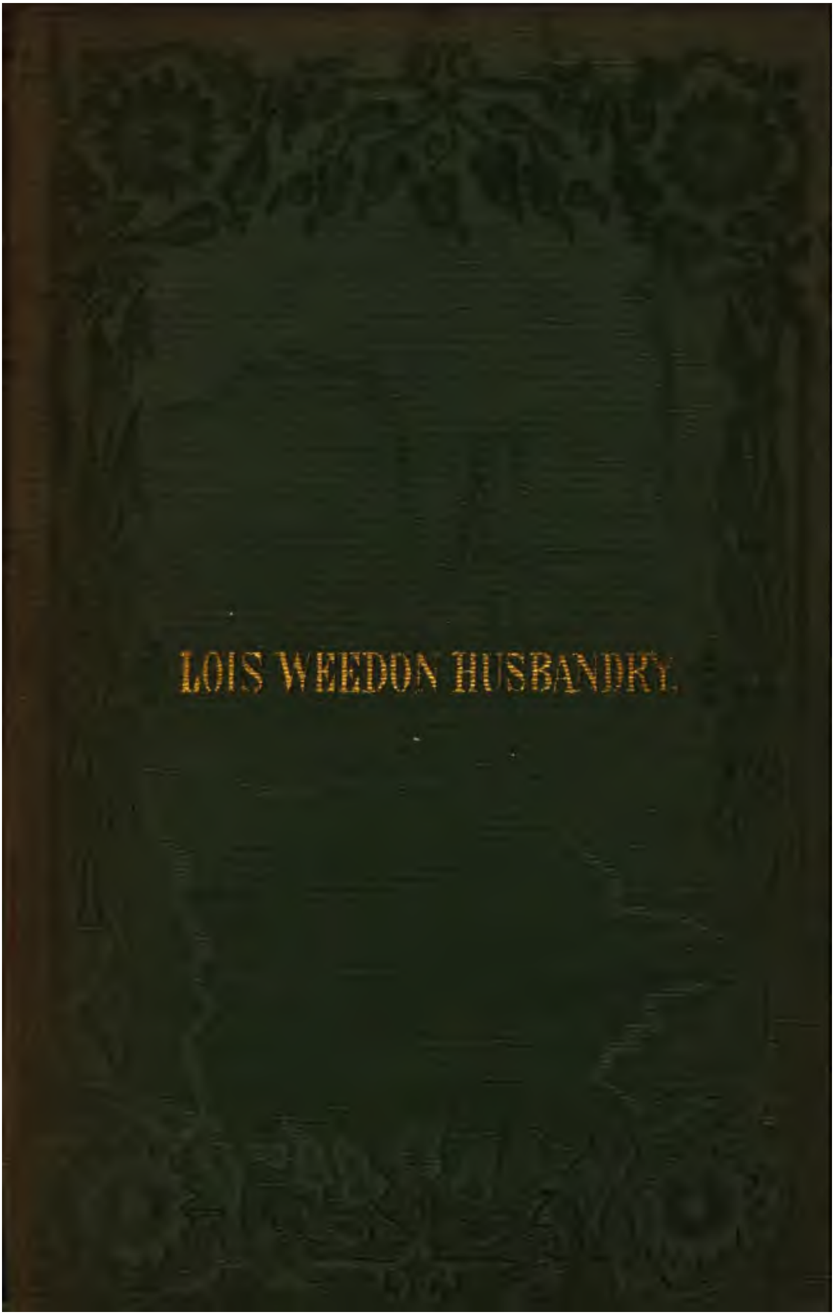

LOIS WEEDON HUSBANDRY.

LOIS WEEDON HUSBANDRY.

Πλέον ἥμισυ παντός.—*Hesiod.*

"By this mode of husbandry, compared with the ordinary mode, the moiety of an acre yields more than the whole."
Free Translation.

BY THE AUTHOR OF

"A WORD IN SEASON TO THE FARMER."

BIBLIOTHECA BODLEIANA
DOMINUS ILLUMINATIO MEA

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PREFACE.

THE publication of "A word in season to the Farmer" originated in the fact of the general feeling among farmers in 1849, that, under the circumstances of the times, it was impossible to grow wheat with profit. Accident has since altered the face of affairs for the present; but the same circumstances and the same disturbing causes remain, and at some future period will probably bring back the same general feeling of anxiety. With this conviction in his mind, the author, in every succeeding edition of his pamphlet, has retained the title,—"How to grow wheat with profit."

Another question, however, has since been agitated, and it has been seriously discussed, without being decided, whether on arable farms, cattle feeding is profitable, or only a necessary evil; in other words, whether the farm produce of food for cattle remunerates the grower.

Without at all entering into this undecided question as it stands, I will only suppose it doubtful whether the practice does enable the tenant to pay, or the proprietor to make, a rent, from that portion of his farm, without further profit. I will suppose that the necessary expenses for the cultivation of an acre of land, so as to produce, for example, average crops of from sixteen to eighteen tons of Swedes or Mangold Wurzel, render the practice un remunerative.

But, supposing it possible to produce,

say, of Swedes or Mangold, average crops of twenty tons from half an acre of land, —that is, from one moiety of the acre in cultivation, the other moiety lying fallow, or rather cleaned and cultivated and dressed for another crop, before the roots come off —say, for winter beans in September; or, supposing the one moiety of the acre to produce an average of four quarters and a half of winter beans, and the other moiety to produce at the same time a good average crop of Carrots or Mangold Wurzel,—it can scarcely be denied that that which was doubtful as to profit before, becomes now a certainty in favour of the grower.

It is one great object of the present publication to show, from the author's own experience, that this is not only possible, but has been accomplished as a regular and long-continued practice in farming.

Instead, therefore, of merely republishing the "Word in Season," which has reference only to wheat, he has here gone in addition as far into this fresh subject—and so far only—as he is warranted by actual proof in his own case, and now offers the results to the reader.

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LOIS WEEDON HUSBANDRY.

THE MANGOLD WURZEL CROP, AND THE WINTER BEANS.

November, 1855.—The growth of the root crop is perfected at last, and the time has come for the quarter-cart. The winter beans are up and strong; and down between the bean rows come the loads of Mangold Wurzel, and are carried to the stack. It is a strange sight to see at the same time one crop going off and another coming on, on the same acre of land; and, when I have cleared the way, I would gladly take the reader with me to look at the process.

Early in April I had drilled the Mangold seed with a hand drill, in single lines five feet apart. The land had been tilled before winter, and farm yard manure had been then trenched in sixteen or eighteen inches deep, with a stirred, crumbly bottom of three or four inches more. Having so far done my part, I left Nature to perform hers. And well did she do it; for those rough clods on the top of the dung had by spring been forced open by the frost and come down to dust.

Nor had that suitable compost of lime and salt been forgotten, but in the proportion of two bushels of lime to one of salt, with fine mould ad libitum, it had been well turned and mixed under cover some months before use; and just before sowing it was spread along the ridges and stirred lightly in with the fork, and the seed after that was sown; the plants when thinned out, being left so close as almost to touch at their full growth. When the plant was up and strong, then, and not till then, came the preparation for the winter bean in September. In the centre of the five feet interval between the Mangold rows, I first went a turn with the plough, and then trench-ploughed the same furrow with another turn, leaving a broad bottom fourteen or sixteen inches deep, to receive the manure. But, how convey it there without disturbing the Wurzel? The indispensable quarter-cart here came to my help. That useful vehicle is little known. It has the body of a common cart. But the shafts, instead of being in their usual place, are shifted in such a way that the off shaft extends beyond the off wheel so as to enable the horse to walk in front of that wheel. And the advantage of such an arrangement in my case is this: In taking off a ripe crop, or in taking on manure, while a young crop is growing in the rows, the wheels of the cart quarter the rows, as a waggon or a carriage quarters the ruts; and thence the derivation—*quarter*-cart.

In hauling the dung, then, for the beans, the horse-track and the cart-wheels—which are five feet apart—went along the centre of the empty intervals, while over the Wurzel-row hung the body of the cart. The manure was then thrown with the ork, in equi-distant heaps, into the furrows, evenly spread along them,—dug in, and the intervals levelled. In the last week of September the beans were dibbled pretty closely in the rows; and there they are now—the middle of November—up and strong.

Having thus cleared the way, let us now go and watch the labourers at their work. Mark how systematically they meet the seeming difficulties of the novel process. The first pulls up the roots of the first row; two others carefully clean them with wooden knives, without bruising the skin; the fourth screws off the tops. The business of the last man is to lay the Mangold in small heaps for loading. But, not yet. For, till the first three rows are pulled and cleaned and topped, he helps the first man to pull. After that, he prepares a pathway for the quarter-cart by removing the roots from the second and third rows, and placing them in heaps on the first row. There; he has done his part so far; and down comes the quarter-cart between the lines of beans, and the three first rows are carried to the stack. Meanwhile he goes on with his work; for two more rows are ready for him, and he tosses the fifth row on to the sixth, leaving a fresh pathway for one of the cart-wheels. We can now leave the workmen for the present; for the same thing is only repeated on the remaining rows, till the whole crop is raised and carried.

This is my main crop of Orange Globe Mangold; and as we walk home we will just follow the loaded cart to the stack, and see how the roots are secured. Adjoining the cow-shed a man is building the stack between temporary posts and rails about three feet high, with a bed seven feet broad, and as long as the crop may require.

Against the inside of the rails all round is placed a thick layer of straw; and as far as the man has gone the roots are built up to the top of the rails, and the roots slope above that, like the roof of a house. When each day's work is finished the top is hung for the time with straw, and so left for some weeks, till the mass, if it be so disposed, has heated and the floating moisture gone out. In due time this loose straw will be taken off; a trench will be made round the outside of the stack; about eighteen inches from the rails a sloping bank of grassy mould will be raised to nearly the top of the rails; some dry mould will be thrown over the wurzel, and the top thatched, as you thatch a rick: with this difference, that in our case the ridge will be plaistered with road-dirt, leaving at every six feet on the ridge ventholes, made with large draining-pipes. A cautious proceeding all this; but, at any time the loss of a costly crop either from frost without or from heating within, would be provoking; but in the coming spring, with little hay and abundant stock, the punishment of improvidence would be felt most severely.

But, we must go back again to the field; for, besides this main crop of Orange Globe, there is a crop of Red Mangold to be got up and carried. They are a stolen crop in lieu of the winter beans, which failed. The dry autumn of last year when the beans were planted,—the unheard of, piercing severity of the winter, and the continued drought of the spring,—all had their effect on the plant, so that it dwindled to a poor promise of three quarters per acre. I set the produce at that sum, for a small patch was left to ripen, and from the yield of that measured space I was able afterwards to calculate what would have been the amount of the whole. I like the winter bean, notwithstanding, and am not so panic-stricken with one failure as to give up the sort. For, in my case it has these advantages over the spring bean: It is shorter in the straw; grown in single rows five feet apart it branches thickly and widely so as to *meet* across the intervals; and in ordinarily good seasons it has pods from top to bottom. With me its produce is large, having given me on one occasion seven quarters per acre; with an average yield of four quarters and a half. Lastly and foremost of all, it ripens a month or six weeks earlier,—to the infinite service of the interlining root-crop, which then has full time to perfect its bulb. For all these reasons I like the winter bean and prefer it, though it did fail for once in a long series of years.

Finding, then, in March that this crop was unlikely to answer my purpose, I sprinkled the compost I spoke of before, of lime and salt, on the stunted lines of beans; and after that forked the beans in. And with this simple stirring of the rows, the land between the carrots was ready for the Mangold seed. Here, then, was the stolen crop I referred to. It is now ripe, and ready for the quarter-cart; and like the rest is carried to the stack.

One other process has to be watched, and then we must leave the Mangold crop.

Grown thus in single rows five feet apart, and so covering only half the acre, what has been the actual produce? We will go and see it weighed; and weighed accurately; for without that,—without a certainty, too, that it is all topped and well cleaned, I should be deceived myself and be leading others into error. The exact number of equal-sized loads had been taken, both of the acre of Orange globe, and of the acre of red Mangold, and there was found to be little or no difference between them. One of these loads is now shot. We see it weighed; and the amount from each acre is twenty-four tons.

Now, if we take, as I believe we may, from sixteen to eighteen tons of Mangold Wurzel to be, in the ordinary way of farming, a fair average from a whole acre; and recollect that the crop of twenty-four tons which we have just been viewing, was taken from only the half of an acre, am I not right in claiming for my motto, The half is more than the whole?

In single rows 60 inches from row to row, the produce of Mangold was, as we have seen, 24 tons. And it may here be asked, "Had they been grown in the usual manner, half that distance apart, namely 30 inches, why would not the produce have been raised to 48 tons, and so doubled?" For this plain reason. To grow fine crops of Mangold and Turnips in the ordinary method, it is considered by many indispensable to thin them out from 12 inches at the lowest, to 14 inches or more, from plant to plant. And even thus, at thirty inches from row to row, it will be found on close inspection, so greedy are the rootlets of the Mangold,—so zealous in their office of feeders to fatten the bulb, that, in their search for food, they cover the narrow two-feet-six-inch intervals, as with a net-work of spiders' webs; while the gross leaves shut out the healthy action of the atmosphere; and both these circumstances together prevent the plant from attaining the fullest development of which it is capable. Let the narrow-leaved carrot, however, which feeds principally from the points of its long tap-root, and little from its almost invisible lateral filaments, take the place of every alternate row of Mangold, and the Mangold roots are almost wholly unobstructed, and to the carrot, therefore, the preceding remarks are inapplicable.

Here, then, is the secret of the unusual size of bulb, and of that fine yield of 24 tons of Mangold from the moiety of the acre. For here, with double the space of interval, the atmosphere has its full influence, and the roots feed without check. Here, with so great a space for growth on two sides, I single my plants without fear, on an average from about 9 to 10 inches apart; and yet raise the bulb to a size unusually large.

Where facts such as these are shown, and the cause of such effects can be given, it is of no great additional service to lay before the reader minute calculations on root-growing, like those we read of in the "Book of the Farm." But, as in some respects they are quite to the point, it may not be uninteresting to him to see, by figures, what might be the result, in weight of bulb, were such and such processes actually carried out. The author is referring to the ordinary Northumberland method of growing turnips,—the calculations, of course, being equally applicable to the Mangold crop. "Turnips, weighing 5 lbs., at 7 inches asunder, give a crop of 57 tons 12 cwt. Whereas the same weight of turnip, at 11 inches apart, gives only a little more than 47 tons. Now, how easy it is for careless people to thin out the plants to 11 instead of 9 inches; and yet, by so doing, no less than 10½ tons of turnips are sacrificed.

Again, a difference of only 1 lb. on the turnip—from 5 lbs. to 4 lbs. at 9 inches asunder,—makes a difference of 11½ tons per acre.

So that a difference of only 1 lb. in each turnip, and two inches in the distance between them, makes the united sacrifice of 21 tons per acre! Who will deny, after this, that minutiæ require the most careful attention in farming?"

THE CARROT CROP.

We have not yet done, however, with those two acres on which the Mangold crop grew. Though the intervals between row and row were five feet wide, they were far from wasted. For, while the beans were growing, and before the Mangold was sown, they had been tilled for carrots. In doing this there was no difficulty, and little expense. They had been heavily manured for the previous crop of Swedes in single rows. They had had a good stirring and a winter fallow, and all that they required after that was a dressing of soot and salt. At the end of March, after the following preparation, I was ready to sow. When I had well sprinkled the carrot seed with water I mixed it with finely pulverized turf mould, and turned it frequently for a week or ten days to dry and to be ready to germinate. I then, with a small double mould board drawn by hand, drew two channels ten inches apart in each interval,—dropped the seed evenly by hand and covered over with a light hand roller.

The harsh dryness of the early spring was most unfavourable to the growth of the carrot. It greatly checked the germination of the seed, and very many of the roots, compared with those in ordinary seasons, were much diminished in size, reducing the weight in the end at least one third. But still they grew and ripened without a blank. And see, the workmen, as before with the Mangold crop, are busy along the rows. Occasionally lifting a stubborn root with the fork, but generally drawing them by hand, the first man provides work for the two next, in cleaning; while the fourth man tops them with the knife, within half an inch of the crown. Arranged in small heaps so as to admit the passage of the cart, they are loaded and carried to the two sheds,—a portion being meant for the four cows,—the bulk of them for the three horses at home.

Carefully weighed, the produce of carrots from the intervals of the stolen crop of red Mangold, is found to be sixteen tons, two hundred and sixty pounds per acre. So that from the same acre of land there has been taken this amount of roots: Red Mangold, twenty-four tons; carrots, sixteen tons two hundred and sixty pounds. Total produce of roots, forty tons, two hundred and sixty pounds.

From the other acre came the twenty-four tons of orange Mangold alone, giving only an actual produce from the moiety of that acre of a higher average than an ordinary crop from a whole acre. But to this we have to add the advantages of a summer fallow in the five feet intervals; the power of cleaning them so thoroughly as to leave not a single weed; the long opportunity afforded for perfect tillage and preparation for the succeeding crop, and the planting of the beans several weeks before the wurzel crop was off, which enabled them to get good hold of the ground before the check of winter.

I stated at the outset that my object in giving these details was simply to show the reader, without a particle of exaggeration, what has actually occurred in carrying out this method of cultivation, what crops I grew for my own use, how they were planted, and what have been the results this present season of 1855, together with the average produce for a series of years. I do not attempt to urge upon him, as a necessity, the code of rules and principles by which I am guided, but shall leave it to his judgment to decide whether those rules and principles are sound in themselves, and whether, carried out in practice, they would not in every case like mine inevitably lead to results like those I have described.

THE SWEDE CROP.

MUCH remains still to be told. I have to speak of the Swede crop, the Drumhead cabbage, and the Potato crop; of the Italian Rye grass and the Lucerne, and lastly of my crops of Wheat. My only fear is that I shall weary the reader with these circumstantial details, or by tiresome repetitions of what I have said before.

I will, however, save him the latter inconvenience in the case of the Swede crop by touching on it lightly and then leaving it; for the process here precisely corresponds in every point, excepting the nature of the manure, with that of the orange mangold. The land was heavily manured before winter. Early in the spring 1 cwt. of guano was stirred in six inches below the surface, a single channel was drawn along the ridges, which were five feet apart, each channel was sprinkled at the rate of 1 cwt. per acre, with superphosphate, and the seed then deposited thickly with the hand-drill, lightly rolled, and left, like the mangold, so close in the rows as at their full growth almost to touch.

My general average of Swedes,* grown thus, has been twenty tons; ranging one season as high as twenty-seven. But, this year's sowing of the Swede will not soon be forgotten by the farmer; how long it remained in the dried up, dusty surface soil, how rapidly it was taken off by the fly when it came, and how in many cases, sowing after sowing was all in vain. I did not escape altogether; but the second

* Skirving's "Improved."

plant came, and stood. It came so slowly, however, that though in the end it made a fair show of what would be reckoned good sized roots in ordinary farming, it came short altogether of the size of bulb I usually grow. And there the crop stands, ready to be topped and cleaned, a row of winter beans—as in the case of the adjoining orange mangold—running along each interval. The quarter-cart at length does its office, and the Swedes are lightly stacked, being meant for immediate use in boiling, together with carrots, for the fatting pigs; and for thirty sheep now fatting off on the adjoining grass field.

The weight of the crop per acre was nine tons. To this, however, must be added, as in the case of the mangold crop, the five feet fallow, cleaned, dressed, and prepared for the beans, which were planted six weeks before the Swedes were off.

THE DRUM-HEAD CABBAGE.

For immediate use, too, for the sheep and cows, stands the drumhead cabbage, in rows five feet apart, and two feet six inches from plant to plant. A noble crop, with its leaves generally meeting and occasionally intermingling across the five feet intervals, the plants in many cases measuring six feet in diameter, a great portion of them weighing thirty pounds; very many forty pounds and upwards; and one of them forty-eight pounds. The trenched ground had been heavily dressed at the depth of sixteen or eighteen inches —the surface sprinkled with ashes of weeds and burnt clay, and forked in; and the manured intervals left, as a bare fallow, in the highest possible condition for the succeeding crop of Swedes or mangold wurzel in the spring.

Counting the number of plants, and striking the average weight as near as may be, the cabbage crop will amount, per acre, to about thirty-three tons. The cabbage at this moment, the middle of December, is about half consumed, and any one looking at the land would feel disposed to ask the meaning of those heaps of mould which lie along the ridges from which the cabbage was taken. They are heaps of refuse cabbage leaves, which, left on the land as they fell, would dry up and waste, but covered over with earth, ferment, and yield many loads of valuable manure.

THE MODE OF CULTIVATION FOR THE FOREGOING CROPS.

December.—Some days have passed since the root crops were carried and housed, and much has been done meanwhile. We had left the leaves of the root-crops on the land, but not to wither and waste away, for they are full of the richest materials for future crops, containing of nitrogen alone a much greater amount than the bulbs themselves. The unmanured ridges on which the carrot-crop grew were the most exhausted, and they were, therefore, the first to be tilled and heavily dressed with dung. For clean and accurate tillage,—for bringing up definite quantities of a few inches of subsoil, in even layers, and placing them on the surface to be acted on by the atmosphere before mixing with the staple, the Fork is the only implement at present on which I can depend. For, the exposure of the subsoil is a matter of bit by bit. At an early stage of my farming about twelve years ago, a chain or two of my land was ill dug with the spade by a heavy hand,—a spit of eight or ten inches of clay was brought up and then mixed with the staple; and the error has taught me a lesson. The clods, covered with mould, and thus kept from the influence of the atmosphere, have never been effectually weathered; with all my stirring, I have been defied, and that stubborn piece has defeated me to this day. But the fork, judiciously handled, is able to effect what has hitherto been beyond the power of any other implement, and to bring by degrees the heavy clay subsoil mixed inch by inch with the shallow staple, to the required depth of mellow, friable mould. To the fork, then, I must still look for perfect tillage in this instance, as well as some others. But, there are occasions when the plough can be used with equal advantage and greater economy; and whenever they do arise, I plough. The present was one of them; and had it been possible I would gladly have used on this occasion the plough and the subsoiler so accurately shown in detail in Mr. Stephens' "Yester deep land-culture." For, of all the implements hitherto devised these approach the nearest to what I want for economizing labour. Think of a plough at one stroke going fifteen inches deep in clay soil, leaving a clean-bottomed furrow fourteen inches wide; and then of the subsoiler following and working five or six inches deeper still, with its mechanism so perfect as not merely to cut through and stir, but, by an inclined plane, actually to lift and break the close mass in such a manner as to admit the intermingling of the ploughed soil and undersoil together. Then think of the reported results of this combined operation,—that this heavy land is brought to a pulverized (?) state from nineteen to twenty inches deep; that the sample of the wheat and the quality of the roots are greatly improved; and that the produce is nearly doubled.

Receiving this statement of the author with the same good faith with which it is clearly given, we cannot but acknowledge that it is one of the most interesting and important improvements in tillage ever made for the benefit of the farmer.

I speak of the application of this method of tillage, in its integrity, to ordinary farming. For, to the plan I am advocating, in which only the moiety of the acre is cultivated, by intervals, at the same time, the Yester deep land-culture is only partially adapted. Take my clay land, however, as it is, a great portion of it having many years since been dug two spits deep. Throw the ridges up with the Yester plough twelve or fourteen inches high. Go another turn with it in the furrows, cleaning the bottom of the furrows fourteen inches wide. Then come with the Yester subsoiler five or six inches deeper. Let all this be done before winter, when the land is dry; and *then leave it with the subsoil in the furrows exposed to the frosts of winter*; and a more perfect fallow could not be conceived.

But—to return to the actual operations

on my land—this plough and this subsoiler were not within my reach, and I was forced to work with the best tools I had. In preparation, therefore, for the plough, the leaves of the carrot and the red Mangold were first raked together in straight clean lines on the bed of the Mangold rows, and then with two turns of the plough at eight inches deep in the pulverised carrot-bed, were completely buried. Another turn deepened the furrow four or five inches more, leaving a clean bottom thirteen or fourteen inches wide,—the few crumbs that were left being shovelled on to the ridges.

These furrows being formed for the manure, the Manure itself demands some notice. Little need be said of that from the cow-yard; for being day after day spread evenly, and well trodden down by the cows when let loose for watering, it requires no further preparation, but, when ready, is taken out to the field, and dug into the land at once to ferment there. But, for my present purpose, I must speak somewhat in detail of that which comes from the offices and stable and yards nearer home. The tank to receive that is three feet deep, with a deeper tank adjoining to catch the overflow; and the whole is sheltered from the sun and wind. The three or four months accumulation has now grown to a goodly mass. This has first to be thrown out, and carefully shaken and mixed; and, that nothing may be lost, a bed of soil, a foot-deep, is spread on the ground, and on that they form the dung-heap for the cart. To supply this soil, heaps of clay and loam are always in readiness close by; and when the layer of dung reaches three feet in height, a thin layer of loam is spread over it; and in the end, a thick layer of clay covers the sloped heap, as with a roof. Very shortly after this, in favourable weather, the quarter-cart again will be busy. And this will be the plan of proceeding: The lands being five feet wide, there are just seventeen furrows to the acre; and my allowance of dung, at the rate of about fifteen tons to the acre, is eight small single-horse-loads to three furrows; and these eight loads, will all be taken with the quarter-cart, and shot into the middle furrow of the three. Provision will then be made for another three furrows in the same way, till all the middle furrows have their threefold quota of dung,—two-thirds of the whole number of furrows being thus left empty. The manure having been laid along the furrows on which it was deposited, will then be lightly covered over with the fork, and left for the present. And the subsoil plough, going seven or eight inches deep, making the whole depth of these furrows nineteen or twenty inches, will be sent up these empty furrows. Common subsoiling on tenacious clay like this, has but little effect, and that little soon ceases, the soil quickly coming together again, and closing up, as if the iron had never touched it. But, in the case before us, the subsoil is exposed, and the known results follow. These furrows, then, thus treated, will be left for the present to be acted upon by the frost. When the first sharp frost is over, these subsoiled furrows will be stirred with the scarifier, after which, the final preparation will be made for spring. The three workmen, taking the three first furrows, will cast two-thirds of the dung out of the middle furrow, spreading it right and left in the two empty furrows, and covering over, and digging the middle furrow, and covering over that. The same process will take place in each of the remaining triple furrows; and the work of manuring and tilling this moiety of the acre for the root-crop is done.

In the spring, the guano for the Swedes and the lime and salt for the Mangold, will be forked in; and after the channels are drawn, and the superphosphate is spread, the land will be ready for the seed.

It will be full time, when the Swedes and Mangold are set out in the spring, to plough and dress, in the same manner, the intervals containing the buried root-tops, and to prepare them, *secundùm artem*, for the beans in September.

All this process of cultivation for Swedes and Mangold and Beans, as it cannot be shewn in actual operation at this moment, I am compelled to describe by pen as what has been before, and what will be in future. Nor can I *shew* the actual rotation of the beans and cabbage and root-crops, on these three acres of the land. I must be content to say that, without binding myself strictly to rule, the rotation is six course, each half acre being reckoned an acre; and that the carrot crop, by itself, is never manured with dung.

But, I can take the reader, if he will go with me, to the field again, to witness the workmen forking between the bean rows which are growing. The tops of the orange Wurzel and Swedes, which grew there, had been left in the intervals. These, you see, they are now digging in. Carrots are to come here in rotation; and will want no further manure besides the soot and salt in the early spring. So, look at the first-rate fallow they are making. Each man, you perceive, has an interval to himself, and, as he digs* to the depth of thirteen inches, and about seven inches from the beans, he casts a fork-full of the soil right and left, leaving a furrow in the centre, and two high ridges alongside the beans, and so sheltering them from the frost. The whole acre is almost finished; and if you have an eye to appreciate true lines in farming, it will be gratified here; for no arrow could go straighter to the mark, than these lines of ridges, and those rows of beans. Very beautiful, too, is the vegetation of those broad-leaved, healthy plants, without a chasm to disturb the symmetry of the picture. And if your vision is far-sighted and prophetic enough to look onward some months, and to display to you the crop, growing, and branching, and spreading, across those wide allies, and meeting there, you can conceive a part of the pleasant and unceasing interest of farming such as this.

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* With the "Lois Weedon Fork," made, with long tines of unusual strength, by Messrs. Burgess and Key, Newgate Street.

"It must be expensive, however, this pleasant forking." Let us see. Let us watch the workmen for an hour or two.

There are, as I said, seventeen intervals in the superficial acre. The men have, each of them, just begun an interval, and when they have done a certain space, we will measure it, and then calculate how long they would each be in digging an interval from end to end.—Well? what time will they take?—"Exactly a day." Let us, however, just call the head workman, and see if we are right. "Yes, sir, you are quite right. We have gone over it ourselves, and we have found that one man would finish the whole of the seventeen intervals in seventeen days." Here, then, we have the exact sum for thus digging to the depth of thirteen inches, nearly four-fifths of an acre; for the amount, at 2*s* a day, is 34*s*.

Now we have begun calculating, let us go on with it from this first stroke of work on the carrot land, to the housing of the crop. The crop is the carrot crop; and when I have premised that, from the time I first broke up the land, my rule has been to let no weed run to seed, and that the wide intervals have permitted me so thoroughly to clean them as to require scarcely any hoeing at all, we will go on to the next process after forking.

The next process, then, is, the spreading of the soot and salt by hand, and forking it in, and levelling for the seed-bed 15*s*; soot and salt 10*s*; drawing the channels and sowing 6*s*; seed 11*s*; cutting through and thinning 10*s*; hoeing 2*s* 6*d*; harvesting 28*s*.

Total expenses for the carrot crop £5. 16*s* 6*d*.

We are now enabled to estimate pretty accurately the net value of this year's unmanured carrot crop, which we gave an account of at the outset; for the intervals on which they grew were treated precisely as those were treated which we have just witnessed on the spot.

	£.	s.	d.
16 tons 260 lbs. of carrots at 40*s* .	32	5	3
Deduct expenses . .	5	16	6
Rent, rates, and taxes, &c. .	2	6	0
Net profit of carrot crop .	24	2	9

The cost of cultivation for the Red Mangold on the same acre with the carrots was about the same as that for the carrots; to which, however, we must add manure.

24 tons of Mangold Wurzel at 15*s* .	18	0	0
Deduct expenses £5. 6*s* 6*d*; manure, carting and spreading £4 .	9	6	6

	£.	s.	d.
Net profit . . .	£8	13	6
Mangold Wurzel crop . .	8	13	6
Carrot crop . . .	24	2	9
Total net profit per acre .	£32	16	3

I do not at all wish to force these prices on the reluctant reader. I hear of upwards of 50*s.* a ton given for carrots in this neighbourhood; and I see undisputed statements at agricultural meetings of 45*s.* And, for myself, I know the consuming value to be at least 40*s.* for carrots; and 15*s.* for Mangold Wurzel. If, however, the objector still insist on 20*s.* a ton for the carrots, and 10*s.* for the Mangold, he is at liberty to have his will, and the account with him, would stand accordingly, showing a net profit of only £10. 13*s.* 7½*d.*

THE POTATO CROP.

To grow potatoes of a good quality it is necessary to plant them in a soil totally different from that which is devoted to the crops I have been describing. I have, therefore, set apart for this purpose an angle of the field where the four acres of wheat, to be spoken of by and bye, are annually sown; and as I have no other land of the same description, being light gravelly loam, good for barley, turnips and potatoes, I plant potatoes there, year after year, on the same half acre. To enable me to do this successfully, I set the seed whole, of the size of a hen's egg, and about seven or eight inches only from set to set, in single rows five feet apart.

After the crop is off I split the ridges on which it grew, and with deep ploughings first make a high ridge in the centre of each fallow interval,—again plough the furrow that has thus been left,—subsoil it, and leave it exposed till mid-winter. I then split the fresh ridge, and throw it back by deep ploughings on to the weathered subsoil; again plough the fresh furrow,—subsoil that, and leave it to be weathered; and then scarify and pulverize it. After this process I manure the furrows with guano and salt, mixed with the turf mould, hereafter described under the head of The grass land; plant at the usual season, and earth up.

One of the sorts I grow is the York Regent, which throws its dark leaves across the five feet intervals, where they meet. Another sort is the Lapstone Kidney, for which I am indebted to Mr. Cuthill gardener, of Camberwell, who has written so well in his pamphlet on the method of growing it with success. The Lapstone Kidney is with great reason admired as one of the best potatoes ever used, for every good quality a potato can possess.

All refuse potatoes, small, damaged, or diseased, are steamed at once for the stye.

THE ITALIAN RYE GRASS.

We now come to a crop, which for extraordinary bulk, as well as for most nourishing, nitrogenous food for cattle all through the year, excepting the late autumn and winter months, has no equal. I mean the Italian Rye Grass. To any one who has read the lately published work which treats expressly of this green-crop, and which for condensation of matter and for style is one of the best pamphlets ever written on an agricultural subject, there will be little new in what I am now going to say. And I should have been well content to refer the reader, without another word on the subject, to Mr. Dickinson's "Instructions for growing Italian Rye

Grass," published by Ridgway, if I had not bound myself, very willingly, to go into every useful detail of farming in actual operation at Lois Weedon.

In adapting his plan, then, to the peculiar circumstances of my farm, I set apart two roods of land, brought by a gradual exposure of the subsoil from a tenacious yellow clay, to a dark, deep, fertile loam, adjoining the liquid manure tanks of my cow-shed. To make these tanks most economically useful, by retaining the Rye grass year after year on the same half acre, I sowed last spring a moiety of this allotted space; and in September, I completed the other half. That which was sown at spring will be broken up after the fourth or fifth crop next year, and the land will be manured and sown again in August. In the following August the autumn sown crop will be treated in the same way. This alternate process will be carried on year after year; and thus a constant succession of sowings will secure perennial cuttings from the spot most favoured by position conveniently to produce them.

Mr. Dickinson's directions are to this effect: When the land is tilled, cleaned, dressed and pulverized, sow the seed if possible in August, at all events in September, at the rate of two bushels per acre each way of the land—two bushels this way, and two bushels that way across; and then bush harrow lightly. The broad cast machine, the long trough and harrow, to be used. We are further directed, as an indispensable condition for success, to dress the land at once—even the same day—after every cutting, with the cooling nitrate of soda in the summer months; in the colder seasons, with guano; at the rate per acre of 2 cwt. of the former, and somewhat more of the latter. This is to be done in the absence of liquid manure of a certain strength. After the guano and nitrate, I saturate the land with the liquid from the tanks and with water, from Kase's forcing pump and Waithman's hose of the requisite length. But, no top dressing is used that may vitiate the taste of the grass, or by its solidity exclude the atmosphere from the plant.

In the autumn sowing I followed the directions pretty closely; but in the other instance, by sowing in the spring, and by not sowing thickly and across, I committed a double error. As it was, however, I have had four heavy cuttings in the season; and, if it were not enough for an honest man to declare that a faithful fulfilment of the conditions he lays down will ensure, in six or seven cuttings in the course of the year, a bulk of green food amounting to at least sixty tons per acre, experience so far has convinced me, that he is fully entitled to credit.

THE LUCERNE.

But, it is well known that all animals love variety in their food, and thrive upon it. To the Italian Rye grass, therefore, I have added the classic Lucerne. I had of old heard much of this plant; how choice it is in its food; how precarious in unsuitable undersoils; how short-lived at best in ordinary treatment; and how quickly it is choked to death by ineradicable weeds. On the other hand, antiquity ran mad about it. "Agrum stercorat. Macra animalia reficit. Curat agrota. Jugerum ejus toto anno tribus equis abundè sufficit." "Tanta dos ejus est ut cum uno satu amplius quam triginta annis duret." At last I came across a sober and well digested plan in Harte's "Essays on Husbandry," published in 1768, which met the difficulties of its cultivation, and held forth high promises of perennial growth, and of a produce unheard of before. "In April sow the seed in a nursery, and thin the plants and keep them clean. Take them carefully up in August, cut off the shoots to within five or six inches of the crown, and shorten the tap roots to seven or eight inches long. Having before hand deeply dug and manured a suitable well drained spot with spit dung, transplant the Lucerne eight or ten inches from plant to plant in single rows three feet apart. Weed the beds with hand and with hoe. At first it will yield little; but still cut the plants as they grow, to give them strength and make them branch. The second year after planting, the produce will increase. In the third it will yield you four full cuttings at least, very probably five or six; and its life will last longer than yours." Such is the substance of Mr. Harte's advice; and I thank him for it, as I do for the suggestion of a motto for my work.

"Cut the tap root of the Lucerne plant, and thus check its descent, and lure the roots into the intervals, and there feed them with their proper food." Here was the plan for my purpose. So, modifying it in some measure,—sowing in spring, and for safety sake transplanting in the following spring in double rows two feet apart, with intervals of three feet, I have verified to a certain extent the assertions of the author by this year's results.

About two roods of my clay land are in Lucerne, transplanted in the spring of this year. But, on my gravel piece there are two roods of this plant which have reached their third year; and even this ungenial season has given me four bulky cuttings of the most heartening green stuff an animal can eat. Cows devour it greedily, and it fattens and invigorates horses as if they were feeding on corn. "In fact," says a black letter quarto, "no better food can be desired for cattle wherewith they will better feed or sooner rise." It was very striking to see it flourishing this spring, when a blade of grass had not shot elsewhere. And scarcely any thing in vegetation can exceed the beauty of its growth and of its foliage of tender emerald green. I quote with all the pleasure of entire sympathy the impression made by this growing crop on the cultivated mind of the Essayist whom I have followed. "The regularity of the rows, and the exactness of distance from plant to plant amuse the eye as a work of industry. It is something, also, to behold, as it were, the returns of several springs in the same year. To day, the field is clothed with verdure. To-morrow, it is cut and removed. In a fortnight more, it appears in all the bloom of fresh vegetation, and in another fortnight arrives at maturity. Thus, the picture changes almost every day,—a variety and repetition of appearances rarely to be found even in the vegetable world!"

I grow my Lucerne thus, and cut it with the sickle. After every cutting the rows are cleaned, and dressed with gypsum, and horse-hoed; and watered, if dry. In winter, a dressing of soot is applied, and forked in in the spring. If the cuttings are more than can be consumed, the grass is brought home and made into hay. It makes excellent hay, without further making than gently forming it into small cocks, and as gently turning them till half dry, when the hay is carried to my open-slated, well-aired hay-loft, and bedded between layers of straw. For green food, I cut the Lucerne the day before using, to dry as much as possible in the time; and give it sparingly at first.

The frenzy of the ancients about Lucerne, does not prove to be excessive, after all. For, no writer can be more candid and truthful than the one I have quoted; and he assures us, from calculations in his own case, that, even in the second year, when it had not arrived at its due size, the produce of his transplanted Lucerne amounted to ten tons, at least, per acre. And, with relation to other men's crops, treated in the same way, he brings forward reliable instances of twenty, and even forty tons.

THE GRASS LAND.

The quantity of land I held for my own use at the outset was twelve acres, in two adjoining fields, and both of them were then in grass. About twelve years ago a part of the worst field of the two, with the shallowest staple, was broken up, the turf having been breast-ploughed and taken off; and some time afterwards the remainder was treated in the same way. In this field are grown all the crops—excepting the potatoes and the three year old Lucerne—which I have been describing, together with the wheat crop which I shall speak of hereafter. At the present moment, thirty sheep are grazing on the grass field, fed twice a day with cut swedes, and once with cut cabbage, and a little corn;

and my expectation is that they will be fat, and earn from 8*s* to 10*s* a head, when they are sold off at the shutting up of the field for hay. For, the field is mown every year, giving a poor yield of a little more than a ton of hay per acre. On many occasions I have sorely felt the inconvenience and loss of the ordinary mode of carrying the hay, and stacking it in the open, being caught by the rain before thatching, and losing much by damaged outsides, and sacrificing a part which had been well made, in waiting for the remainder. Carrying hay to a common barn never answers; for it destroys its sweetness, and brings mould. But, a hay loft made in this way appears to secure all the benefit of out-door stacking, without any of its inconvenience or loss: Let the roof be made of open slating,— the two sides and one end also open to admit the air; with a door at the other end to receive the hay. Devoting the upper part of a large barn, with a wattled floor, to a hay loft like this, I have had two years' experience that the hay, stacked thus under cover, keeps perfectly sweet, without damage to a single straw; with these important additional advantages, that the crop as it is made, can be carried in portions, bit by bit, and requires no thatching.

When the aftermath is come, the four dairy cows are sent in to graze till November, when they are shut up, and soiled during winter on carrots and cabbage, with straw and hay chaff mixed. I now, in November—for the threefold purpose of profit, treading, and manuring—purchase a lot of sheep to take the place of the cows, in the grass field, apportioning the number of sheep to the amount of cabbage and swedes grown in the season. In spring and during a part of the summer, the cows are fed on mangold wurzel, Italian rye grass and Lucerne, the latter two varieties of fodder carrying them on to the succeeding aftermath.

I have said that the produce of hay from this grass field is poor, though the quality of the land and the dressing I give it—occasionally guano—justify larger expectations. The truth is this: It has been in grass and been grazed and mown so long, that the roots of the grass, if even able from their matted and peaty condition, to perform their functions healthily, have, I conceive, no adequate supply of mineral food to compensate the loss of that which has been taken off.

On more than one occasion I have also stated in the foregoing narrative, that for various purposes I use fresh loam and turf mould; and the thought may have crossed the reader's mind, from whence those valuable materials could have come.

I have devised a plan, that may have been adopted often and often before, though I am not aware of it,—by which I secure both these objects by the same process; not only benefiting the pasture, but gaining the soil I want. I have as yet tried it on only a few lands, but the process is so easy and comparatively inexpensive, that I see no obstacle to its being gradually carried out with proper implements—the turf paring plough and the cultivator—over the whole field, or over many fields. The plan is this: My grass field is in high backed ridges; and I first pare a certain extent of turf, and leave it rolled up, here and there, in the furrows. I then dig a certain depth of the staple—about six inches in my case—on the top of the land, graduating it to nothing at the furrows; and either throw it into the cart at once, or heap it in the parts of the furrows which are empty, to be carted off at leisure. Here, then, is the turf mould and the soil I had to account for. And, when the nature of this substance is considered—when it is recollected how full it is of the rich vegetable and other matter existing in the matted grass roots, most of which were an incumbrance while living, but are infinitely useful when dead; and what a vast amount of fertilizing mould is thus provided, amounting to two or three hundred tons per acre, the gain so far of actual manure for worn out land, and for various purposes on the farm, cannot fail to be acknowledged at once.

The land, then, on which I have thus been operating, is now bare and level; and the next process is to stir and pulverize that surface three or four inches deep, and then to supply the mineral food which the grass requires. And this is done in moist weather by a dressing of superphosphate, mixed with a little soot or guano for forcing the plant. After this the turf is laid down again, not closely, but for inoculation, and some mould thrown over the whole to fill the gaps. This is all performed in November, or any open weather till March; and a slight sprinkling of grass seed completes the work.

Reason tells me that a scheme such as this will restore my field more rapidly and entirely than the costliest surface dressing.

For, while the whole top-supplied food has to find its way slowly down to the close-packed, unhealthy roots, this bottom supply is at its post at once—the right thing in the right place—to say nothing of the benefit of the newly stirred undersoil. The matted incumbrance being removed, fresh young feeders are thrown out, and take up the food placed before them with a youthful appetite long unfelt by the plant, which grows up in renewed health and unwonted luxuriance.

One other advantage of this plan is, the utter destruction of most of the tap-rooted weeds, which exhaust and smother the grass.

THE WHEAT CROPS.

My horses, cows, pigs, must have good beddings of Straw, or they never do well. And the hay must be mixed with straw-chaff, or it never would last. And the dung and the straw must then go to the heap, or the green crops would certainly fail. Green-crops for cattle food all require forcing by some means. And among those means, each having its special purpose, are the costly guano, and other portable manures; not omitting those rich liquid streams above or underneath; but, after all, and for every purpose—for clay soils, especially, to keep open the pores, as well as to fertilize—there is nothing so good as the Dung-heap.

But, whence comes the straw to make these good beddings, and to furnish this chaff, and to lick up the fluid and hold the droppings, which give me the food for my green-crops? The question brings me to my *Wheat crops.* For, if I did not grow straw, it is clear that I must buy it. A portion I do buy every year, for I do not grow enough. Five acres and a half of my arable land are in wheat, and five acres and a half in roots, grasses and beans; and the straw of the wheat does not give me dung enough for the green-crops. How, then, would it be, had I to dress with manure the whole of these eleven acres?

Here I come to the turning point of this scheme of farming. *For these five acres and a half of wheat require no dung at all.* Nay, while the green crops, in order to pay, require to be forced, the wheat crops, on this plan, not only do not require it, but absolutely will not bear it. So that were I to alternate my wheat with the beans or the root-crops, which are heavily manured, the cereal crop, on this plan, would become gross and mildewed; to say nothing of the inconvenience of the change, and the fatal delay of sowing after the roots come off.

"No manure for your wheat at all: How is this?" Before I reply, let me take the reader to see the crops, and how they are grown. Come, first, to the clay field; the field on which the beans and the green crops grow. The plant here looks well and strong; but it is thicker in the rows than it has hitherto been; for, I have sown thicker, for the sake of the sample and for safety sake. The sort is the red Lammas, at two pecks per acre, a large seeding for me; and a portion of it is the eleventh unmanured crop on the same acre of land. It is in triple rows, you perceive—a foot between row and row, with three feet intervals which are fallow; a common bare fallow, without the common accompaniment of a fallow,—the loss of a crop. It is kept constantly clean; and in June a turn of the plough, making a furrow in the centre of the intervals, will earth up the wheat and keep it from falling. The effect of that process was strikingly shewn this season; for my crop was heavy—the heaviest and best I have ever had. Parted only by a low hedge stood my neighbour's crop of manured wheat, equally good with mine; and so it continued till a short time before harvest, when the storm came, and down it fell.

A few days of rain, and the crop would have been ruined; as it was, it was only made lighter. On the same sort of soil, with the same aspect, but unmanured and on a different plan, all of mine, excepting a few yards, stood perfectly upright, and was wholly uninjured. From the number of shocks thrashed out for seed, compared with the number all through, the estimated yield this season approximates six quarters per acre. The ten years' average from this moiety of the acre has been thirty-four bushels; a very high average on any plan from a whole acre. And here, too, therefore, the proverb holds good—The half is more than the whole.

Let me just notice in passing, that, so far from its unexhausted state being advantageous, this fresh-broken up land for several years produced over-luxuriant crops, and very frequently the usual evil results; and it is only now, after the eighth and ninth crops, brought to a healthy condition, at last yielding wheat of a good quality and sample. It is a great thing, nay, essential, to have strong facts to confirm a positive assertion. And the facts are here: Two years ago I added to this wheat-piece on the clay, about half an acre, which had been in roots and manured. Both years, that new portion of the wheat-crop was blighted, and seen to be so, to a foot; while the original, so-called exhausted portion, was perfectly clean. The same thing occurred on the four-acre gravel piece. Two years ago a very small strip, which destroyed the uniformity of the piece, was added; and that—having before been manured for roots—was blighted on both occasions;

while the original four acres wholly escaped; the bright straw of the latter, and the brown of the former being marked and divided, as if by design.

A short way off is this four acre piece of light land; and we will now go and see the wheat crop there. I took these four acres from my tenant for the express purpose of experiment on a totally different description of soil from the clay land, and in a totally different condition. For, it is a light, gravelly loam, the gravel greatly predominating. It was totally exhausted between five and six years ago; exhausted, that is, in the ordinary acceptation of that term. For, it had never known a bare fallow in the memory of man. Four years before it had been manured for swedes, which were carted off the land. It had no dressing for the three following crops, the rotation ending with a crop of wheat, sown broadcast. In this condition, the stubble standing, I entered upon the field in October, 1850. I then simply ploughed the whole field an inch deeper than it had ever been ploughed before; cleaned and levelled it; and so, without further preparation, got in my wheat. Out of the five unmanured crops which have followed, the yield from these four acres was twenty quarters and a half in 1851; and in 1854, twenty quarters; bringing the average of the five years to about thirty-four bushels. Come with me now, and see how the sixth crop looks at this moment. No one can deny that it is coming up well and strong. The sort is the Victoria red, from fine seed from the clay piece, at two pecks per acre. The intervals are dug already. And see how the raised ridges shelter the young plant from the cutting winds. Observe, also, that here, instead of triple rows, there are but two rows of wheat, with three feet intervals. Why is that? Simply for the greater ease of hand-weeding and hoeing; for, in this neglected field the accumulated foulness of a century is the great difficulty I have to fight with, and overcome. And you will notice, besides, that the intervals are dug only one spit deep; for this reason: In former diggings I found that over the largest portion of the field I had to deal with a gravelly subsoil, evidently deficient in mineral food for the wheat plant. As I could not, therefore, bring up what I wanted, from below, I carted the clay from a clay pit in the corner of the field,—after weathering and turning it again and again,—and spread it on the surface, to be mixed with the staple and dug in. The yield of this year is comparatively light on this light land, amounting only to 25 bushels per acre. But the sample—being a mixture of Lammas and Bristol red,—was one of the best in the neighbouring market, and sold the last week in December at the highest price then and there offered for new wheat.

There is no difficulty in accounting for the deficient yield on this occasion. For, the reader will recollect, that, when this crop was sown, the land, which before had triple rows of wheat with three feet intervals, was drilled with double rows with intervals of three feet. Let him draw a sketch of this on paper.*

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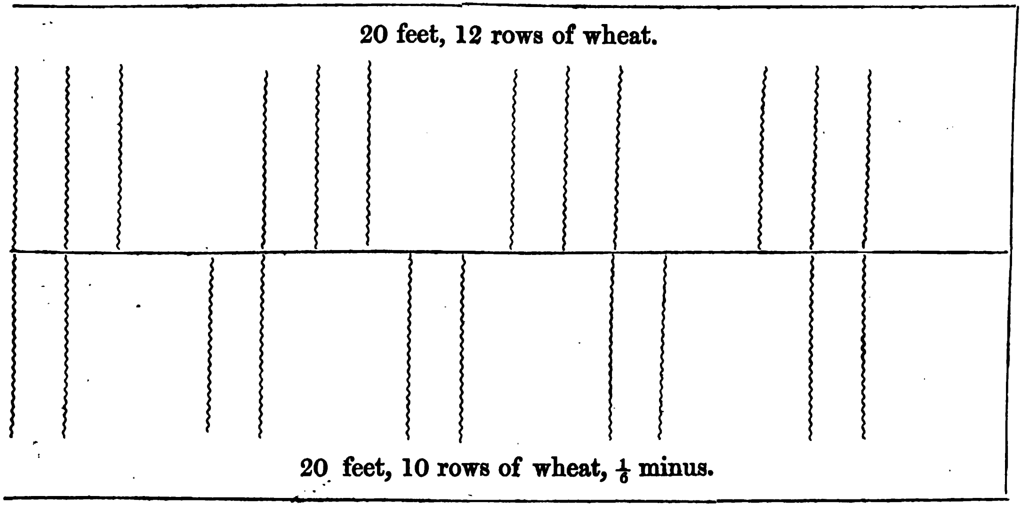
* See diagram.

Diagram of triple and double rows of wheat, each with 3 ft. intervals.


20 feet, 12 rows of wheat.
20 feet, 10 rows of wheat, $\frac{1}{6}$ minus.

Let him trace out, on a proper scale, four triple rows in twenty feet, and underneath, on the same scale, five double rows in twenty feet. He will thus see that, by this change, there is a loss in every twenty feet of two rows of wheat, being a loss of one sixth of the produce on the whole field. So that if the yield from the triple rows were thirty-six bushels, that from the double rows would be thirty bushels, and so on, in proportion, upwards or downwards; upwards to forty-two bushels, or downwards to thirty. He will see, further, that a great proportion of the two rows of wheat for which I am accounting, grew on the exact spot occupied by the previous crop of three rows. The effect of this was strikingly shown in the growth last year. For, where one row out of a double row grew thus, and the other grew in the old fallow, the latter was four or five inches higher than the former, and in the end much more prolific. And where both rows grew on the site of two rows of the old plant, the whole double row was greatly inferior to the double row which grew in the unspent interval which fell to its lot.

Such, hitherto, have been the results of my Wheat culture; and as long as I accurately fulfil the conditions I have laid down, I have no fear whatever of, humanly speaking, endless and uninterrupted success. Each condition, recollect, has its reason; some conditions being of greater force, indeed, than others; but the fulfilment of the following I have found, after long experience, to be indispensable for insuring bulk of produce and goodness of sample:—A clean, pulverized fallow at the outset; a fine description of seed; early and thick sowing, at the rate of two pecks per acre, in order to secure a full and even plant; weeds uprooted by hand and hoe; intervals stirred with judgment; the crop earthed up when in full ear. And all this on wheat land, that is, on clays and heavy loams, which must be pulverized to the letter, or the result may be failure. If the chosen spot be not wheat land, it must be clayed or marled, and made so. Failing clay within a paying distance, the deficient mineral substances—to be ascertained by analysis—must be supplied by portable manure. Let me add, that, had I to *begin* this practice of growing wheat, on my limited extent of ground,—were I not provided with the drill and the roller, which, with me, accomplish their work very completely, I should adopt the line and the dibble, the latter of which would give the solid bed I require, and the former secure that regularity and straightness in the rows, which so facilitate after operations in cleaning, and are so pleasing to the eye.

With reference to the means of carrying out this plan, it has often and often struck me under what extreme disadvantages I labour in working on so small a scale. Rough buildings, with little and poor accommodation; implements of the rudest kind; carts and men so limited in number as to disable me occasionally from seizing that critical moment on which a whole year's success may depend. I have felt, at the same time, how unjustifiable any change, how wasteful and ridiculous an excess of expenditure would be, in order to produce such small comparative results.

Nor will I deny that, when I have looked on my fine growing crops, my thoughts have gone further, and I have conceived with what ease and delight, were I a farmer, I could enlarge my five acres of wheat to fifty or a hundred, with buildings and implements and men to meet my requirements. The best drills by the best maker,—and two, three, or more should be working at once;—the horse-hoes, made by Garrett, for cleaning; Reapers, for expedition; all adapted to the scheme, the horses walking in the intervals. And lastly, Diggers—two, three, or more,—to save hand-labour in these days of war (?) and emigration.

I have spoken hitherto of the fork as

unapproachable for fulfilling my object in tillage. But, at last, I have faith in the Digger. It is difficult, perhaps impossible by words, to place clearly before the eye an implement which is somewhat complicated, not so much in itself, as in the way it acts on the soil. But, I will make the attempt. The object to be attained is literally to pulverize a certain small portion of the subsoil, year after year, and then to mix it with the staple: this, according to my views, being indispensable for success in growing wheat without manure. We will suppose, then, the field to be acted on at the outset, to have a staple of five inches, with a clay subsoil; that it has been ploughed to the depth of the staple, — cleaned, harrowed, pulverized, as for barley; that it has been marked out and sown according to rule; that the wheat is up, and the lines visible.

We have fallow intervals, then, of three feet to be duly prepared for the succeeding crop. How is that to be done? A preparatory operation is first to be performed with a light plough with a narrow sole and mould-board, which takes the centre of the interval, and going up and down five inches deep leaves a furrow 14 inches wide at the bottom. This lays bare the subsoil, and leaves a ridge of the pulverized staple right and left alongside the two outer rows of wheat.

The furrows being thus prepared, the subsoil is to be stirred with a suitable subsoiling implement, 4 or 5 inches deep and 14 inches wide, and left in rough clods to receive the full force of the frosts of winter. This is a great step in advance; for at spring it will be in a semi-pulverized state, fit for the digger, which is to bring it up and to cast the staple below it. The digger is circular, with forking tines, covering a space of 14 inches. The disc which holds the tines revolves round a spindle, which, by a novel lever apparatus, is raised and lowered in the frame, at will. The two hind carrying wheels are four feet apart to take the centres of the spaces between the two rows of wheat, on either side. In front, to take the centre of the furrow, is a swivel wheel; and two horses at length draw by traces.

We will now suppose the horses to be hooked on; that they take the digger to the furrow; and that the discs are lowered 4 or 5 inches into the weathered subsoil. The implement moves forward. Mark how well it does its work, and see how the upturned clay, when it reaches a certain height, momentarily hangs in the air, It has met the scrapers, which are so fixed as to prevent it from being carried round, and which cast it down again into the furrow behind. For the forks themselves I am indebted to the kindness of Mr. Samuelson, though not for the mode of fixing them, or for the frame and the lever, which differ from his altogether.

But, if this were the only operation it performed—good as it is, so far,—it would be still far behind our great object of placing the subsoil at the top, and the staple underneath. Look closer, then, and you will see two mould-boards,—one on each side of the forks. They are attached by stems to the same spindle which carries the forks, and there are fixed. They are somewhat of the form of a common plough mould-board, though shallower, their ends extending behind as far as the forks, and within 2 or 3 inches of them on either side. Now, notice the effect. You see the ridges of pulverized staple to the right and left of the furrow. While the clay, then, as the forks bring it up, hangs in the air for an instant, the mould-boards, gathering the ridges, and moving onwards as the forks move round, cast the staple underneath, and the subsoil falls upon it.

How the same process is carried on the succeeding year; in what way the stubble is buried; how the untilled portions are moved; and what provision is made for going deeper when depth is required: all this it would be premature to dwell upon now. Suffice it for the present to say, that this vision of the Digger "which I see before me" is no mere vision; for, it has been tried already, to a certain extent, with success. On the four acre piece every alternate interval was forked by hand last winter, and in spring the digger completed the rest,—I do not say with entire success, but with enough to prove that, altered as it is now, it will effect its purpose. This is quite clear, that, (the mould-boards being removed) as an implement to mix the staple and the subsoil together, as well as to stir and clean the surface soil, it is superior to any horse-hoe or scarifier I have ever employed, throwing up the weeds out of the ground, and leaving them exposed on the surface, to die.

A narrative like this would lose its interest as a statement of facts, without a balance sheet; and would want clearness, without a further remark or two, to introduce it. It has been said, that it is difficult, nay, almost impossible to tell the value of a bushel of wheat, to the grower. Meaning, of course, that the expense of growing wheat in the ordinary way, is so much mixed up with the expense and the dressings of the other crops in the rotation, as to defy all accuracy of calculation in the matter. The saying, however, is inapplicable in the present case; for, grown always on the same acre of land; taken out of rotation altogether, and unmanured, the cost of the wheat crop, and therefore of its value, is a question which lies in a nutshell. Prove the cost of its cultivation, as we can to a farthing, and the question is answered at once.

This proof I will proceed to give, after one more remark on the digging of the clay and the gravel land The digging of the clay had reached from 18 to 20 inches deep, four years ago; and, having all been made friable, and been kept so by the buried stubble, has required no more than one spit deep for the last two years, and will not require more for many years to come. The charge, then, here, for forking the moiety of this acre of friable soil, is reduced to 20*s.*; while the charge for hand-hoeing and weeding this clean land, is only 5*s.*

The gravel land has been forked and made friable to the depth of 13 inches; and as it is needless to go deeper, except with the subsoiler, in the gravelly bottom, that also requires but one spit digging. But, as there are more fallow intervals there than on the clay, a smaller space being covered with the crop, the charge for digging is 25*s.*; while the charge for cleaning this foul land, till better times, is 15*s*.

Balance sheet for the clay piece:

	£	*s.*	*d.*
Rent	2	0	0
Forking ½ acre . . .	1	0	0
Horse-hoeing at spring . .	0	1	0
Ditto before sowing . .	0	2	0
Drilling and rolling . .	0	2	0
Two pecks of seed, at 8*s.* 9*d.* .	0	4	4½
Rolling at spring . . .	0	1	0
Hoeing and hand-weeding . .	0	5	0
Earthing up wheat . . .	0	2	0
Bird keeping . . .	0	4	0
Reaping, carrying, and thatching .	0	13	0
Thrashing, winnowing, and marketing . . .	1	0	0
Rates, taxes, and interest on outlay	0	6	0
Total expenditure . .	£6	0	4½

The estimated yield this year is 6 quarters, but I will take it at 5 quarters of clean wheat.

	£	s.	d.
Five quarters, at 70*s*. . .	17	10	0
A ton and a half of straw, at 40*s*. .	3	0	0
Deduct expenditure . .	6	0	4½
Total net profit	£14	9	7½

Or, put it in a different way, and take the average produce of 34 bushels at 40*s*. per quarter.

	£	s	d.
Expenditure . . .	5	16	0
Four quarters and 2 bushels, at 40*s*.	8	10	0
A ton and a half of straw, at 40*s*. .	3	0	0
Deduct expenditure . .	5	16	0
Total net profit . .	5	14	0

Balance sheet for the gravel piece, taking the average produce of 34 bushels at 40*s*. per quarter; the general expenditure being the same as that for the clay piece, but adding 5*s*. more digging, 10*s*. for cleaning; and the charge for claying being divided and spread over several years.

	£	*s*.	*d*.
Wheat and straw . .	11	10	0
Deduct expenditure .	6	16	0
Total net profit . .	£4	14	0

To return to the question of manure.

I made just now the startling assertion, that, on wheat land, wheat, on this plan, will not bear the forcing induced by manure. But, when it is considered that, (taking for granted for a moment that every element of fertility is already provided by nature,) the food for the plant is made so accessible to the roots in this wide pasture of pulverized mould,—that the plant has the full benefit of the sun and the air, as well as of space for its roots,—taking for granted for a moment, that by these means it finds nourishment enough, it will no longer be a matter of surprise, that I should go beyond the old maxim and assert, that this Enough is *better* than a feast. For, while enough leads to health, the feast brings disease; while enough food for the wheat plant brings the grain to a healthy maturity,—more than enough leads often to over-luxuriance, mildew and ruin. So cautious, indeed, am I compelled to be in this matter, that, when the plant is doing well, even an injudicious and ill-timed stirring, which is tantamount to a dressing, is unsafe and frequently fatal.

But, why, even for a moment, should we take that for granted, which we are able to prove? The assertion is, that, on wheat land,—that is, on the great majority of clays and heavy loams, no manure is required for wheat on this plan, since its food in abundance is there already. Now, what is it that feeds the wheat plant, and swells the grain, and builds up the straw? Organic food is wanted, and mineral, too. Carbonic acid and ammonia; silica and sulphate of potash,—the phosphates of potash, magnesia, and lime,—all are wanted, and more. And all these which are mineral, exist in the soil; and the atmosphere gives the rest. When I speak thus, I am really stating nothing but what the commonest man's common sense may prove. He can prove it by going to the men *who know.* Analysis of the soil has given them this knowledge,—as the same process tells them the contents of the dung heap. Ask them plainly, whether the soil and subsoil of clays and loams, generally though not universally, do or do not contain all that is wanted as *mineral food* for the wheat? Ask them, further, whether tillage, and pulverization, and gradual exposure, and annual fallows, will not render soluble a sufficiency of these substances for your annual need? If they reply "Yes;" but demur to the plan and add, that, In time it will exhaust the capital of the land,—ask them once more, "In how long a time?" And if they answer, "Why, in some cases, in a thousand years or more, in others five hundred, and in some a hundred;" your rejoinder must be a smile; for you would surely feel, that even a hundred years' supply should satisfy living man.

But, consult them once more, and ask about the food which is called *organic;* and let them say, whether experiments have, or have not, proved the atmosphere to contain a sufficiency of this. Carbonic and nitric acid and ammonia: Do the dews and the rain, the air and the snow bring down into the soil enough of each to provide food for the wheat plant, and, on large leaved plants, for immediate service, a vast amount of their needed organic support? And if they do, do not the pulverized intervals of the wheat, in the annual fallow, absorb and retain it for use?

Having come to this point of organic food for the support of plants, on the system of intervals, I should be greatly wanting in candour if I did not linger here awhile to speak of Tull. For, it was on this very point of organic food for vegetation, that the theory and practice of this great man wholly and solely turned. He believed that, by pulverizing the staple of his broad intervals, either mechanically or by exposing the clods to the action of the atmosphere, the divided particles of the soil would become, in the annual fallow, so invested with vegetable matter, which he called "earth,"—that matter having first been exhaled into the air, and then brought down by the rain and the dew—that it, and it alone, would feed his crops, year after year, ad infinitum.

But, he laid it down as a fixed rule, that he must never plough below the staple. So that, in order to obtain a sufficiency of this pulverized soil where the staple was shallow, he threw the whole of the staple into the ridges, leaving a broad, bare furrow in the centre of each interval, down to the untouched subsoil. Where the staple was somewhat deeper, he left some of the pulverized staple in the interval; and, if deeper still, still more. In this way he secured, even in a shallow soil, a foot depth of mould underneath his growing crop.

I am speaking now of what, as I read it, his practice and his theory actually were, from his own plain words; which, however, plain as they are when they are brought to the surface, we have to dig out with no little difficulty from the somewhat rough but fertile subsoil of his work.

When I say, then, that Tull's fixed rule was never to plough below the staple, I am authorized by what he enjoins in the following passages: "We must never plough below the staple." C. 11. You cannot go "too deep, unless you go below the staple of the ground." C. 11. Plough "as deep in the intervals as the staple will allow." C. 11.

But, what does he mean by "Staple"? He means what is generally understood by the farmer now,—the upper stratum of earth, be it shallow or deep,—the under stratum being clay, or chalk, or gravel or sand, or any such like substance. What I have to do with, however, is especially a clay subsoil, as distinguished from the staple. And here Tull speaks quite clearly when he describes "the rills of water that run upon the surface of the clay under the staple or upper stratum of mould." C. 18. And afterwards, of "the water that runs from a hill in two manners, namely, upon the surface of the staple, and upon the surface of the clay that is under the staple." C. 18.

If, therefore, Tull never ploughed below the staple, and the staple ceased when it came to the clay, he clearly never touched the clay.

Again, that Tull depended wholly on vegetable matter to feed his crops, without any reference at all to mineral matter, is equally plain to my mind. For, not to enter too much into detail, which would be merely to repeat what I have said elsewhere, the following passages by themselves prove it by the clearest logical deduction. "If it should be demanded from whence the soil can be supplied with vegetable matter to answer what is carried off by these constant crops of wheat, that the land be not consumed by them?"—after answering Mr. Bradley, he replies, "The soil in this our case cannot be supplied in substance, but from the atmosphere. The earth which the rain brings down can do it alone if it fall in great quantity." But, "Dews must add very much to the land thus continually tilled and hoed." C. 11.

And, to sum up, he adds,—"Could we as easily compute the quantity of earth in rain water as the quantity of water is computed, we might perhaps find it to answer the quantity of earth taken off from our hoed soil annually by the wheat." C. 11.

If, therefore, Tull thought that the rain provided an exact equivalent for the substances carried off by the wheat, it is clear that, as he gave no account, so he took no account of any mineral substances at all.

I am now in a position to reply to the

question which has been put to me so strongly that it demands an open and explicit answer on my part,—"What do you claim as original in your system of tillage?"

I claim the originality, such as it is, of going below the staple and bringing up to the surface the clay subsoil, while the wheat is growing at its side. The accident of living in a happier age than Tull has enabled me to claim the originality of thus finding a supply of mineral food which is practically inexhaustible, to feed the plant. —In every succeeding account of the practice of Tull's scheme in its integrity, I find continual complaints of the loss of crops by the frost, from the exposure of the plant from the furrow slice taken from the sides of the rows before winter:—I claim the originality of bringing up the subsoil without injuring the plant, but on the contrary of giving shelter to it by the ridges of each interval.—I claim the originality, as compared with Tull, of narrowing the intervals while I increase my staple, and thus, assisted by my supply of mineral food, doubling my produce.

But, God help me! I am boasting a great deal. I do hope and trust, however, that I have never published my opinions presumptuously; and I am quite sure I should never have spoken thus, had the question not been put to me so directly by a writer eminent and influential in agricultural literature.

In a leading journal devoted to the interest of the Farmer, a series of papers has lately been introduced by that writer, on the subject of Tull's husbandry. They how great research, and are written in a style of singular excellence, and have helped to call attention very forcibly to the work of one, who was the greatest genius in his way, and the most far-seeing cultivator of the soil, the country has ever produced. I fully agree with him that Tull anticipated draining and subsoiling; and I believe that, had he lived till even the dawn of agricultural chemistry, uniting as he did great mechanical talent with accurate practice and ingenious theory, he would have left little to be done by us, his feeble descendants. As it is, I fear he had no prophetic view whatever of those mineral elements of fertility,—those indispensable phosphates and alkalis,—those silicates and sulphates, of which we are enabled to talk so glibly now. And I think it will be clearly seen, from the passages I have quoted above, that Tull taught his followers, and made it a rule to himself, never to go below the staple, in the sense I have always endeavoured to explain it. So that, if he had practised on my clay soil, which for the most part has a staple of only five inches, he would never have moved the subsoil; instead of doing as I have done,—bringing it by degrees to a friable depth of nearly twenty inches. For, at the end of twelve years I have only gained that point; my practice being to bring up only two or three inches of this tenacious substance at a time, and for the last two or three years not even that.

After a few words more on the nature
ality of this clay field, I shall bring
rvations to a close.

When I decided, many years ago, to break up this field which was then in grass, a neighbouring farmer, with most kind intentions, did his best to dissuade me from the enterprise. "It gives you but little grass—scarce a ton of hay to the acre—and it will give you no crops. If it does, they will be smothered with weeds, and your wheat will come down." But, when I not only persevered,—breast-ploughing the turf and taking it off the land,—when I not only broke it up, but brought to the surface the yellow, stiff clay, the condemnation was universal; and farmers and ploughmen all cried, with one voice, that "the land was ruined for ever." Year after year, however, has seen its powers of production go on increasing. The Spade and the Fork have turned the tide; and the retort is now, "No wonder the crops are fine, for the land is so good!" They are perfectly right. The land is good land; difficult to work, indeed, but excellent for wheat, and green crops of every description. And, when it is recollected that the gradual exposure of the subsoil in annual fallows renders gradually soluble and brings into play those very substances which, in some cases, are so costly to purchase,—when it is considered, especially, that the potash and soda, which form so important an element in the constituents of our root crops, abound in a soil like this, the wonder will cease that the produce in my case is so large, and that deep culture and constant stirring are the staple of my story.

It was not my intention at the outset

to say a word having reference to the practice or the omissions of others; but, if what I did say were found applicable or useful, it should be so in the simple form of suggestive. I meant merely to fulfil a request made by many, that, in its various details, I would all my husbandry dilate, whereof by parcels they had something heard, but not distinctively. But, in speaking of the quality of the clay soil I cultivate, I am bound, in justice to the principles I advocate, to say, that though the land is good, it is by no means peculiar; that a wide strip of the same formation, geologically speaking, runs through the country from the English Channel to the North Sea; that, in other formations, there are thousands and ten thousands of acres of hitherto impracticable and unremunerating clay, which might be brought by similar means to a similar condition with that recorded in this little narrative of Lois Weedon Husbandry.

THE END.

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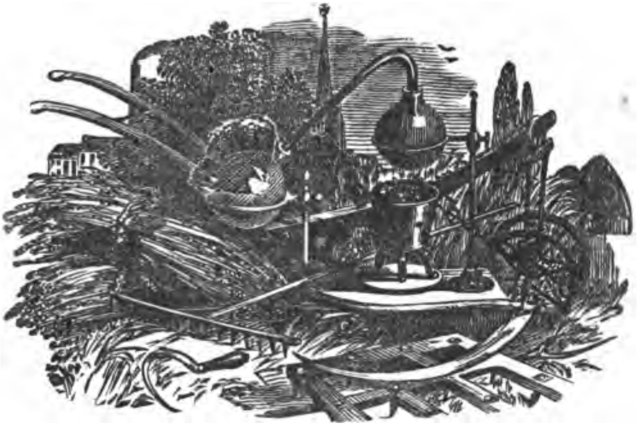

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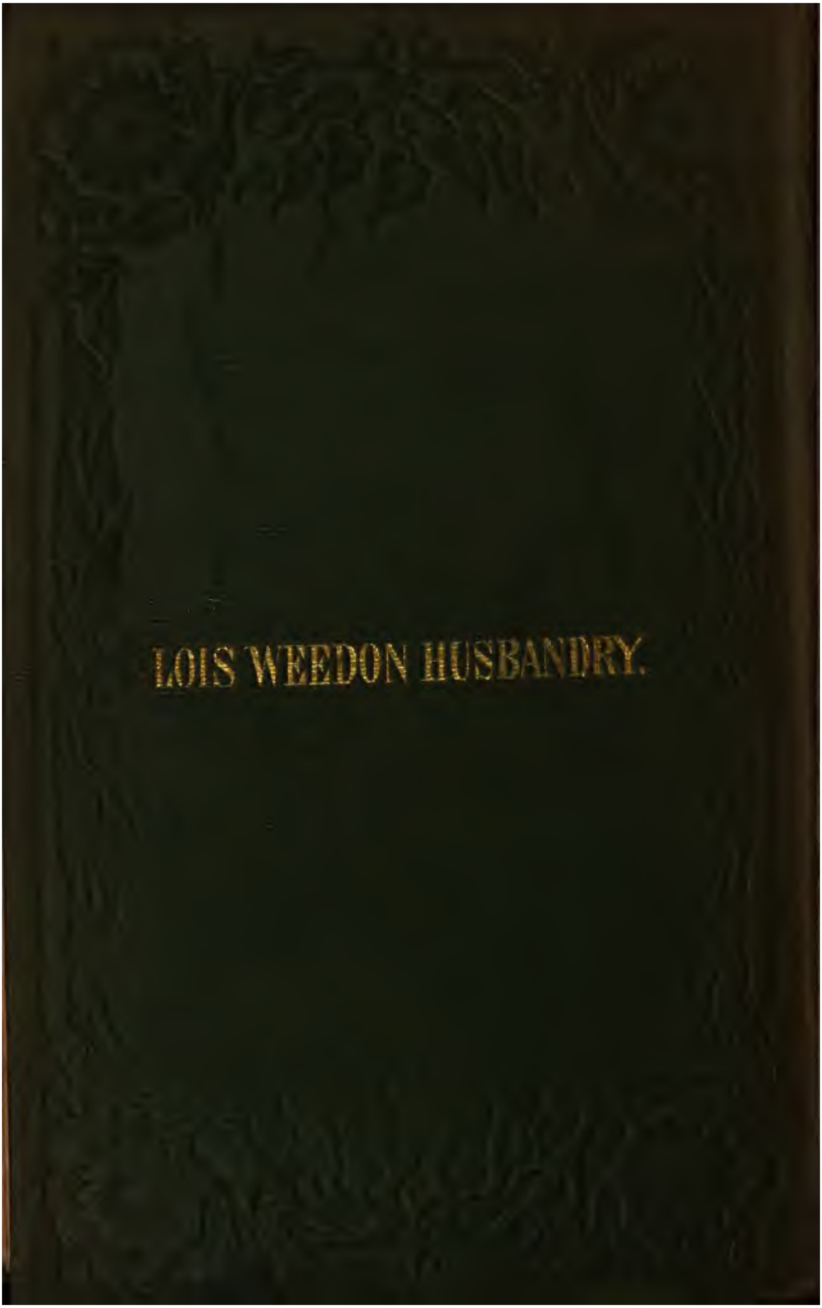

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